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PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)
TRANSMITTAL
(Fees are subject to annual revision)

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Application Number	**10/827,325**
Filing Date	**April 20, 2004**
First Named Inventor	**Seiki MORITA**
Art Unit	
Examiner Name	
Attorney Docket Number	**500.43792X00**

Enclosed is a petition filed under 37 CFR §1.17(h) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of $ 130.00 is enclosed.

This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees)

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. 50-1417:
☐ petition fee under 37 CFR 1.17(f), (g) or (h) ☒ any deficiency of fees and credit of any overpayments
Enclose a duplicative copy of this form for fee processing.

☐ Check in the amount of $ _____ is enclosed.

☒ Payment by credit card (From PTO-2038 or equivalent enclosed). Do not provide credit card information on this form.

Petition Fees under 37 CFR 1.17(f): Fee $400 Fee Code 1462
For petitions filed under:
§ 1.53(e) - to accord a filing date.
§ 1.57(a) - to according a filing date.
§ 1.182 – for decision on a question not specifically provided for.
§ 1.183 – to suspend the rules.
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
§ 1.741(b) – to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g): Fee $200 Fee code 1463
For petitions filed under:
§1.12 - for access to an assignment record.
§1.14 - for access to an application.
§1.47 - for filing by other than all the inventors or a person not the inventor.
§1.59 - for expungement of information.
§1.103(a) - to suspend action in an application.
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
§1.295 - for review of refusal to publish a statutory invention registration.
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
§1.377 – for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
§1.550(c) – for patent owner requests for extension of time in ex parte reexamination proceedings.
§1.956 – for patent owner requests for extension of time in inter partes reexamination proceedings.
§ 5.12 – for expedited handling of a foreign filing license.
§ 5.15 – for changing the scope of a license.
§ 5.25 – for retroactive license.

Petition Fees under 37 CFR 1.17(h): Fee $130 Fee Code 1464
For petitions filed under:
§1.19(g) – to request documents in a form other than that provided in this part.
§1.84 – for accepting color drawings or photographs.
§1.91 – for entry of a model or exhibit.
§1.102(d) – to make an application special.
§1.138(c) – to expressly abandon an application to avoid publication.
§1.313 – to withdraw an application from issue.
§1.314 – to defer issuance of a patent.

Name (Print/Type)	**Carl I. Brundidge**	*Registration No. (Attorney/Agent)*	**29,621**
Signature		*Date*	August 29, 2005

500.43792X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Seiki MORITA

Serial No.: 10/827,325

Filed: April 20, 2004

For: ANOMALY NOTIFICATION CONTROL IN DISK ARRAY

PETITION TO MAKE SPECIAL
UNDER 37 C.F.R. § 1.102 (M.P.E.P. § 708.02)

MS Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

August 29, 2005

Sir:

Applicants hereby petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d). Pursuant to MPEP §708.02(VIII), Applicants state the following.

(A) This Petition is accompanied by the fee set forth in 37 CFR §1.17(h).

The Commissioner is hereby authorized to charge any additional payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) All claims are directed to a single invention.

If the Office determines that all claims are not directed to a single invention, Applicant will make an election without traverse as a prerequisite to the grant of special status in conformity with established telephone restriction practice.

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(C) A pre-examination search has been conducted.

The search was directed towards anomaly notification control in a disk array. With reference to the disclosure, FIG. 1 illustrates an information processing system with a storage device 1000 connected with host computers via a storage area network. FIG. 4 illustrates an internal construction of the storage device 1000 and the controller 310. The controller 310 first executes the management processing shown in FIG. 5 for each disk drive case to identify the kinds of individual disk drives 220. Disk drives stored in the storage device 1000 are grouped into those that are RAID-controlled during normal operation and those that are not used during normal operation but as spares. FIG. 7 shows a flow chart of sparing processing which is executed repetitively by the controller 310 during an operation of the storage device 1000. The controller 310 monitors each disk drive 220 for a sign of possible failure, namely the number of errors that occur during accesses (S40). See pg. 23, ln. 22-25. When a sign of failure is detected, the controller 310 decides if the disk drive in question needs sparing (S42) and checks if there is any disk drive available for use as a spare (S44). If spares of the same kind are available, the controller 310 selects one of the spares of the same kind (S46) and updates the content of the failure management table (S48). If only spares of a different kind are available, the controller 310 selects one of the spares and performs heterogeneous sparing (S50).

In particular, the search was directed towards independent claim 1, which recites a disk array comprising a disk array rack, a plurality of disk drives installed in the disk array rack, a controller installed in the disk array rack to control data reads and writes to and from the disk drives, and cables connecting the controller with the disk drives, wherein the disk drives

comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller, when it decides that one of the first disk drives fails, performs sparing on the failed first disk drives by using the second disk drives.

The search of the above features was conducted in the following areas:

Class	Subclasses
711	114
714	1, 2, 3, 5, 6, 7, 41
711	directed keyword
714	directed keyword

(D) The following is a list of the references deemed most closely related to the subject matter encompassed by the claims.

U.S. Patent Number	Inventor(s)
5,872,906	Morita et al
6,070,249	Lee
6,154,853	Kedem
6,418,539	Walker
6,915,448	Murphy et al

U.S. Publication Number	Inventor(s)
2005/0086557	Sato et al

Additionally, a computer database search was conducted on the USPTO systems EAST and WEST.

A copy of each of these references (as well as other references uncovered during the search) is enclosed in an accompanying IDS.

(E) It is submitted that the present invention is patentable over the references for the following reasons.

It is submitted that the cited references, whether taken individually or in combination with each other, fail to teach or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to teach or suggest as recited in the claims:

a first feature of the present invention as recited in independent claim 1, wherein a disk array comprises a plurality of disk drives which comprise first disk drives and second disk drives with an interface different from that of the first disk drives, and wherein a controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

Further, the cited references fail to teach or suggest the above noted features of the present invention when taken in combination with other limitations recited in the claims.

The references considered most closely related to the claimed invention are briefly discussed below:

Morita (U.S. Patent No. 5,872,906) relates to a method and apparatus for taking countermeasures for failure of a disk array. FIG. 1 illustrates a disk array 28 with a plurality of disk units 30-00 to 30-35, with disk units 30-05, 30-15, 30-25, and 30-35 functioning as spare units. One parity group is constructed by every five disk units 30-00 to 30-04, 30-10 to 30-14, 30-20 to 30-24, and 30-30 to 30-34 of the ranks R0 to R3 provided for the ports P0 to P5, respectively. The spare disk units 30-05, 30-15, 30-25, and 30-35 are allocated to the respective ranks R0 to R3 in which five data disk units and

one parity disk unit are included. A flowchart of FIG. 2 shows an error recovery process in the case where the spare disk unit was allocated to every rank. Assuming that a failure occurred in the disk unit 30-02 of the rank R0 in FIG. 1, the spare disk unit 30-05 which is fixedly determined to the same rank R0 is selected in step S1. If it is determined that the spare disk can be used in S2, the data of the failure device is reconstructed by the other normal disk units 30-00, 30-01, 30-03, and 30-04 in the same parity group as that of the failure disk unit 30-02 and is written into the spare disk unit 30-05 in S3. After completion of the data reconstruction, in step S4, the spare disk unit 30-05 is set to the alternative destination of the failure disk unit 30-02 and the operating mode is shifted to the normal operating mode.

As understood, the spare disk of Morita is used to replace a failed disk of the same rank in the disk array and does not have an interface different from that of the failed drive. Thus, Morita does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Morita at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Lee (U.S. Patent No. 6,070,279) relates to a split parity spare disk achieving method in a RAID subsystem. FIG. 5 illustrates a RAID subsystem

with a disk array controller 4 connected to a host system 2 and connected to a disk array 6 through buses. The disk array 6 consists of a plurality of data drives S1-S4, at least one parity drive PR and at least one spare disk drive SP. During the initialization control mode of the disk array controller 4, the disk drives S1-S4, PR, and SP are divided into small parity groups and a corresponding storage region is divided into a upper block and a lower block. When one specific data drive among the data drives S1-S4 fails, the data recovery operation as shown in FIG. 9 is executed. The disk array controller 4 detects the failed data drive S1 at step 200. At step 202, the disk array controller 4 sets a recovery flag RCVF. At step 204, the disk array controller 4 copies the lower block parity data LPR stored in the upper block 60A of the spare drive SP to the lower block 58B of the parity drive PR. The disk array controller 4 recovers, at step 206, the data of the failed data drive S1 by exclusively ORing the data of the data drives S2, S3 and S4 and the parity drive PR. At step 208, the recovered data of the data drive S1 is written in the spare drive SP. The drive table is then re-constructed so as to replace the data drive S1 with the spare drive SP. At step 214, the split parity spare flag SPSF is reset. At step 216, the recovery flag RCVF is reset. Since the split parity spare flag SPSF is reset, a parity check using the spare drive SP can no longer be implemented.

As understood, the spare drive of Lee stores half of the parity data until a primary drive fails and then stores the data recovered from the failed drive, but the spare drive does not have an interface different from that of the failed drive. Thus, Lee does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk

drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Lee at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Kedem (U.S. Patent No. 6,154,853) relates to a method and apparatus for dynamic sparing in a RAID storage system. FIG. 2 illustrates a storage system 14 including a plurality of controllers 26 and disk drives 28 connected by two buses 23 and 25. FIG. 3 shows the arrangement of a plurality of disks in which there is an active set of drives 32, 34, 36, 38 and a spare set of drives 31, 33, 35. If the storage system 14 determines that a device is beginning to experience too many input/output errors in response to requests for reads or writes of data, the storage system 14 will then begin writing the data from the failing device to one of the spare devices within the system. As shown in FIG. 4, device 34 has begun to fail and when that is sensed by the storage system 14, all data from logical volume D2 of device 34 will be copied to a corresponding logical volume D2 of device 31. Additionally, all of the data from logical volume D5 of device 34 will be copied to a corresponding logical volume D5 of device 31. The storage system 14 will then find the first logical volume of the next RAID group, RAID group 45, and copy that data onto spare device 31. In order to provide complete protection for the data stored in the remaining devices 32, 36 and 38, the remaining data from logical

volumes D1, D4, D3, D6, D8 and D9 will be copied to the spare devices 33 and 35. After the mirror volumes have been created from the spare devices, the storage system will continue to operate in RAID mode while maintaining mirror copies in the spare devices 31, 33 and 35.

As understood, the spare devices of Kedem copy logical volumes from a failed disk drive in order to maintain RAID groups, but do not have an interface different from that of the failed drive. Thus, Kedem does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Kedem at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Walker (U.S. Patent No. 6,418,539) relates to continuously available computer memory systems. FIG. 1 illustrates a disk drive subsystem including an array of primary 10 and backup 12 drives, and at least one spare drive 14. The subsystem also includes primary 28, backup 30, and spare 32 controllers. Initially, the host computer 35 interacts with the primary controller 28 which, in turn, completes the read/write operations to the primary disk array 10. Simultaneously, duplicate write operations are conducted with the backup mirror disk array 12 so that a complete duplicate data set is maintained on the system. When the controller 28 detects a failure of a disk

40 in the primary disk array 10, further read operations are directed to the backup mirrored disk 42 of the mirrored pair 44. Write operations continue to be made to the mirrored disks 12. Upon detection of a failed one 40 of the primary disks by the primary controller 28, the spare disk 14 is substituted for the failed primary disk 40, data is copied from the corresponding backup disk 42 in the backup array 12 to the spare disk 14, and the spare disk 14 then assumes operations in place of the backup disk 42.

As understood, the backup disk of Walker is used to replace a failed disk in a mirrored pair of disk drives, but does not have an interface different from that of the mirrored drives. Thus, Walker does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Walker at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Murphy (U.S. Patent No. 6,915,448) relates to a storage disk failover and replacement system. FIG. 1 illustrates a local area network 1 with a master device 4 that connects to a plurality of storage devices 1, 2, 3 via a switch 5. The storage is aggregated by running a suitable control program such as RAID. One of the disk drives in the array is designated as a hot-spare 6. In the event of a failure of a disk, the management software of the

SAN detects this and informs the RAID set of a failure of one of its devices. The RAID set immediately starts to reconstruct the data onto the hot spare 6 and continuous availability of the storage is maintained in the immediate aftermath of the failure. When there is a disk failure and failover to a hot spare, this is recognized by the management software which executes an algorithm illustrated in FIG. 8. After detection and failover, the management software establishes a new or auxiliary multi-disk device. When the auxiliary multi-disk device is established it is connected to the SAN as a further slave and is integrated into the existing RAID set with each of the disks as a new hot spare. The failover algorithm then simulates a failure of the data on the good disks in the device containing the failed disk, and their data is transferred to the new hot spares. The management system then indicates that transfer of data from the slave is complete and turns off the device so that it can be removed and the faulty drive replaced offline.

As understood, the hot spares of Murphy re-construct data from a RAID group with a failed drive, but do not have an interface different from that of the primary drives. Thus, Murphy does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Murphy at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Sato (U.S. Patent Application Publication No. 2005/0086557) relates to a disk array device having spare disk drive and data sparing method. FIG. 1 illustrates a disk array device 100 connected to a host device, a plurality of hard disk drives DD0-DDn, and controllers 200, 210. The spare disk drive resource information table 600 as shown in FIG. 3 exists in each of the disk array control units 203, 213 of the controllers 200, 210 and is used for managing the state of a disk drive, which is used as a spare disk drive, in the disk drives 300 to 330. The error rate of each disk drive is classified into three levels indicating the likelihood of occurrence of a failure of each disk drive. As shown in FIG. 5, the disk array control units 203 and 213 check whether or not there is a disk drive that has an error rate which has reached the level 2 in the disk array 800 to 830 (step 900). If such a disk is found and there is an available spare disk, the disk array control units 203 and 213 control the subordinate side transfer control units 204 and 214 and the cache memory 220 to perform divided data copy processing for the detected disk drive (step 920). In addition, the disk array control units 203 and 213 check whether or not there is a disk drive having an error rate which has reached the level 3, in the disk array 800 to 830 (step 930). If such a disk drive is detected, the disk array control units 203 and 213 control the subordinate side transfer control units 204 and 214 and the cache memory 220 to execute dynamic sparing for the detected disk drive (step 940).

As understood, the spare drives of Sato perform divided data copy processing or dynamic sparing depending on the error rate of a failing disk drive and do not have an interface different from that of the primary drives. Thus, Sato does not teach or suggest a disk array comprising a plurality of disk drives and a controller wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives and wherein the controller performs sparing on the failed first disk drives by using the second disk drives when it decides that one of the first disk drives fails.

More particularly, Sato at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and further does not teach or suggest the first feature in combination with the other limitations recited in the claims.

Therefore, since the cited references at a minimum fail to teach or the above described first feature of the present invention as recited in independent claim 1, and further fail to teach or suggest the first feature of the present invention in combination with the other limitations recited in each of the independent claims, it is submitted that all of the claims are patentable over the cited references whether said references are taken individually or in combination with each other.

(F) Conclusion

Applicant has conducted what it believes to be a reasonable search, but makes no representation that "better" or more relevant prior art does not exist. The United States Patent and Trademark Office is urged to

conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the United States Patent and Trademark Office may locate in its own independent search. Further, while Applicant has identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is patentable over the references, the United States Patent and Trademark Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

(G) Fee (37 C.F.R. 1.17(i))

The fee required by 37 C.F.R. § 1.17(i) is to be paid by:

[X] the Credit Card Payment Form (attached) for $130.00.

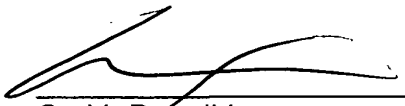
[ ] charging Account _____ the sum of $130.00.

A duplicate of this petition is attached.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (500.43792X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



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